

# CLAIMS

What is claimed is:

1. A method of managing a configuration database for a plurality of objects within a  
5 network element, comprising the steps of:

defining an object reference for each object of the plurality of objects;  
defining a pointer to a memory location for each object of the plurality of objects;  
maintaining a map storing object references and pointers for each object; and  
storing transactions affecting one or more of the plurality of objects in a

10 transaction database.

2. The method of claim 1 wherein the transactions each comprise one or more  
actions modifying state data associated with each object, and wherein the transactions are  
stored in a transaction log file.

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3. The method of claim 2 wherein, in the event of a failure condition, the method  
further comprises the steps of:

restoring the previous transaction of the network element prior to the failure  
condition event;

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re-applying the transactions stored in the transaction log file; and  
resolving the pointer links contained in the affected objects modified by the  
actions comprising the previous transaction.

4. The method of claim 3 wherein the transaction database is stored in non-volatile memory.

5. The method of claim 4 wherein the failure condition comprises one of an unexpected power interrupt condition, an abort condition, or a card element failure condition.

6. The method of claim 1 wherein the transactions are issued by a command handler and passed to the transaction database through an agent process.

7. The method of claim 6 wherein the agent process comprises one of an alarm manager process, an automatic protection process, and a configuration manager program.

8. The method of claim 7 wherein the network element is coupled to a parallel ring network including a first working network and a second standby network.

9. The method of claim 8 wherein the parallel ring network element is a SONET ring network, and the objects comprise transactions on the SONET ring.

10. A system of managing a configuration database within a network management program for a SONET ring network, the method comprising the steps of:

a plurality of managed objects representing logical representations of network entities that can be configured and modified through transactions executed by the network management program;

an agent process that receives transaction commands from a command handler;

5 a database manager that receives transaction commands from the agent process;

a database file that stores commands from the database manager; and

a transaction log file that stores actions included within the transactions issued by the database manager.

10 11. The system of claim 10 wherein each managed object includes an object reference key and a storage location pointer and wherein logical dependencies among objects are maintained through the linking of storage location pointers in the objects.

12. The system of claim 11 wherein actions that modify an object are stored in the  
15 database file and the transaction log file.

13. The system of claim 12 wherein, in the event of an abort condition, the most recent configuration state of the network is restored by re-applying the transactions stored in the transaction log file, and resolving the pointer links contained in the affected  
20 managed objects.

14. The system of claim 12 further comprising a free space list maintained by the database manager, the free space list containing record number and size information for objects that have been deleted and are available for use.

5 15. The system of claim 14 wherein the present state of the managed objects is stored in a memory buffer upon modification by one or more the actions comprising a transaction.

16. An apparatus for managing a configuration database within a network  
 10 management program for a computer network, the apparatus comprising:  
     a loader module for loading managed objects into system memory of the computer network upon a start-up event of the computer network;  
     an agent process for creating new transactions or opening existing transactions affecting one or more managed objects modified by the transactions, wherein the  
 15 managed objects include object reference information and pointer information to other managed objects;  
     a transaction saving module for saving the loaded transactions in non-volatile memory; and  
     a recovery module for restoring previous transactions executed prior to a failure  
 20 condition.

17. The apparatus of claim 16 further comprising a memory map storing the object reference information and pointer information for each managed object.

18. The apparatus of claim 17 wherein the computer network comprises a parallel ring network including a first working network and a second standby network coupling each of the network elements in the network.

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19. The apparatus of claim 18 wherein the agent process comprises one of an alarm manager process, an automatic protection process, and a configuration manager program.

20. The apparatus of claim 19 wherein the computer network is a SONET ring  
10 network, and the objects comprise portions of control cards within nodes of the computer network.